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Feeding strategies to increase small ruminant production in dry environments☆

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Abstract

In the low-rainfall areas of much of Africa and Asia, small ruminants represent the principal economic output, contributing a large share of the income of farmers. Animal numbers have increased over the last two decades, driven by a rising demand for animal products and subsidized feed price (e.g. barley, maize). Side effects of this and changing climatic patterns are increasing desertification, resulting in a decline in rangeland resources, which are often insufficient to meet current demand, coupled with a fall in total feed resources due to overgrazing, ploughing of marginal land and soil erosion. Consequently, goats and sheep are facing serious nutrient shortages. These animals often depend on low quality crop residues (e.g. straws, stubbles) and expensive feed supplements. Technical solutions to some of these problems are available, for example the advantageous use of fodder trees, shrubs and cactus has been demonstrated. Conservation through ensiling and the use of feed blocks (FB) gives greater efficiency of use of a wide range of agro-industrial by-products (AGIBPs). But their adoption has been slow, often because of lack of knowledge of the farmers' problems and expectations. Adaptive research of technologies and management practices are needed, to provide the policy and institutional support for wider adoption of improved production and resource management practices. Some research–development projects based on the farmer participatory approach have resulted in improved crop and livestock technologies being introduced. On-farm surveys and in-depth economic analyses have shown that these pioneer projects have contributed significantly to the welfare of farmers in dry areas. The lesson learned from these projects is that "by working hand-in-hand with rural communities, agricultural researchers and extension specialists, it should be possible to refine and promote technologies and policies that might help ensure sustainable livelihoods and enhance the productive capacity of drylands everywhere". Success stories of technology transfer projects include the Mashreq and Maghreb project (International Center for Agricultural Research in the Dry Areas [ICARDA]-coordinated project).

Keywords: Small ruminants; Feeding strategies; Cereal crop residues; Agro-industrial by-products; Fodder shrubs; Dry environment; Technology adoption

1. Introduction

In the developing world livestock are the key to security for many smallholder farmers (Owen et al., 2004, 2005) and are often used as indicators of wealth. In the drier areas preferred species are goats and sheep, the ranking of the major outputs of milk, meat, fibre, manure and skins depending on local demand, including

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that of the household, and access to markets. Of necessity, the systems are low-input and productivity is low. Increased livestock production is invariably associated with an increase in livestock numbers, while the available land, because of human pressure for more cropping areas and infrastructural development, has gone down (Thomas and Rangnekar, 2004).

Areas of concern include: breeding (local breeds tend to be small and disease resistant, both desirable traits, but they are also low milkers and slow to grow), where cross-breeding is practised the larger progeny require better nutrition and more support to withstand local conditions; nutrition, often resulting from both an inadequate supply of forage and low quality (high fibre low/protein); diseases, including endo-parasitic burdens; management, embracing reproduction, housing and control of resources; access to credit and micro-finance, essential if necessary inputs such as feed supplements and drugs are to be purchased; readily available and relevant knowledge; market information; government decisions and policies adverse to the aspirations of the livestock producer. Most of the problems listed above will be exacerbated by extreme environmental conditions, especially drought but occasionally excessive rainfall resulting in flooding. The onset of drought is only clear through hindsight and its end unpredictable. Although meteorological predictions are still not a precise science and to be of practical relevance the information must be available to farmers, advisers and policy makers to allow forward planning and control of feed resources (or destocking before livestock prices collapse). Long-term steps to mitigate the effects of drought should include water harvesting, the development of drought tolerant crops and appropriate land tillage and livestock management procedures. Water harvesting should include collection of roof water, minimization of run-off and the cultivation of succulents as livestock feed as well as dam building.

Urban areas are affected by drought when dams and aquifers cannot meet demand. Because plants grow predominately in the upper layers of soil, they depend on expected patterns of rainfall; farmers with irrigation are cushioned against immediate effects of drought; those without irrigation, often smallholders, at or just above subsistence, are the most vulnerable group. Even with irrigation, farmers still like to cultivate some vegetables (e.g. pepper, tomato) or fruit trees (e.g. vineyard), which can result in a shortage of forage and the need to buy concentrates. Degradation of rangelands and the need to purchase feeds are pressurizing resource-poor smallholders dependent on small ruminants. This results in diversification within the farmer or of the younger family members, often the men, as itinerant urban workers. Because of the knowledge of small ruminant production of many of these people, it is desirable to stop this drift from the land by creating a profitable farming system (Peacock, 1996). A battery of technologies has been developed to improve the use of local feedstuffs; technical, institutional and policies options have been recommended to improve the small ruminant sector in the dry areas. In this paper potential techniques will be discussed.

2. Impacts of drought on the livestock sector

In drought prone areas keeping of small ruminants, rather than large species, has the advantage that more animals can be kept per unit of land thus spreading risk (six ewes are approximately equal to one cow). However, the use of large ruminants for transport and draught power, together with their emotive value, cannot be ignored. As ruminants, goats and sheep depend on forage as their primary source of feed. In the dry season the forage supply falls and that available is fibrous and low in protein. Unless the diet can be ameliorated growth rates and lactation will decline, to be followed by conception rates and birthweights—on the other hand abortion and mortality rates (especially of twin-born and newly weaned progeny) will increase. In extreme cases deaths, including those of adults, will also increase, resulting in an immediate loss of income until the numbers of breeding females recover (much faster with small compared to large ruminants due to their shorter generation interval).

An obvious first action for the livestock keeper as drought starts to bite is to destock. However, drought does not strike an individual and a consequence of it is the establishment of a buyers' market. A partial solution is to sell all non-breeding stock early in the drought when it is obvious that the season is abnormal but before the pressure on feed resources forces sales.

Government also has responsibilities in helping farmers survive drought: both to sustain food supplies for the urban population (buying imports should be seen as a last resort) and preventing resource-poor smallholders sliding into poverty. Adequate warning systems and market information should be freely available to producers. In extreme cases feed should be moved from areas of plenty to where it is needed at a subsidized rate. An alternative form of subsidy is on delivered product but the disadvantage of this is that stock retained for breeding would not benefit. The provision of credit through micro-finance schemes is essential, both for the purchase of inputs and restocking. 'Pass on the gift' schemes, run by several non-governmental organisations (NGOs) can also help